REMARKS

This reply and amendment is in response to the Office Action mailed June 25, 2007. In response to the Office Action, claims 1 and 35 are amended and claims 2, 4, 36 and 38 are canceled. Claims 1, 3, 5-35, 37 and 39-68 are now pending in this application.

In the Office Action, the Examiner rejected claims 1-68 under 35 USC § 102(b). The Examiner cited U.S. Patent No. 5,900,852 to Tanaka et al. (Tanaka et al. hereinafter) as the basis for this rejection.

The application claims a method (claim 1) for addressing a matrix screen of bistable nematic liquid crystals with nematic anchoring. Claim 1 recites the steps of: i) applying controlled electrical signals respectively to row electrodes and to column electrodes of the screen; and ii) simultaneously addressing a plurality of rows using similar row signals that are offset in time by a duration greater than or equal to the time column voltages. Claim 1 specifies that the row addressing signals have in a first period at least one voltage value serving to break the anchoring of all of the pixels in the row, followed by a second period enabling the final states of the pixels making up the address row to be determined. The claim further specifies that the final states are a function of the value of each of the electrical signals applied to the corresponding columns. Claim 1, as amended, also specifies that the screen uses two textures of liquid crystals, one texture being uniform or lightly twisted in which the molecules are at least substantially parallel to one another, and the other texture differing from the first by a twist of the order of ±180°. Claim 1 also specifies the following relationship:

$$\tau_C \leq \tau_D < \tau_L$$

in which relationship:

τ_D represents the time offset between two row signals;

τ_L represents the row addressing time comprising at least an anchoring breaking stage and a texture selection stage; and

τ_c represents the duration of a column signal.

Claim 35 recites a device for electrically addressing a matrix screen having a bistable nematic liquid crystal with breaking of anchoring. Claim 35 recites: i) a means suitable for applying controlled electrical signals respectively to the row electrodes and to the column electrodes of the screen, and ii) a means suitable for simultaneously addressing a plurality of rows using similar row signals that are offset in time by a duration greater than or equal to the time column voltages are applied. Claim 35 specifies that the row addressing signals have in a first period at least one voltage value serving to break the anchoring of all of the pixels in the row, followed by a second period enabling the final states of the pixels making up the address row to be determined. Claim 35 further specifies that the final states are a function of the value of each of the electrical signals applied to the corresponding columns. Claim 35, as amended, specifies that the screen uses two textures of liquid crystals, one texture being uniform or lightly twisted in which the molecules are at least substantially parallel to one another, and the other texture differing from the first by a twist of the order of ±180°. Claim 35 as amended also specifies the following relationship:

$$\tau_c \leq \tau_D < \tau_L$$

in which relationship:

τ_D represents the time offset between two row signals;

τ_L represents the row addressing time comprising at least an anchoring breaking stage and a texture selection stage; and

τ_c represents the duration of a column signal.

The Examiner rejected all claims 1-68 as anticipated by Tanaka et al. With regard to his rejection of claim 2 and 36, the Examiner cites Column 3; lines 32-59 of Tanaka et al. and FIG. 1 as support for the Examiner's view that Tanaka et al. "discloses a method and device of addressing a matrix screen of bistable nematic liquid crystals with breaking of anchoring, wherein the screen uses two textures, one texture being uniform or lightly twisted in which the molecules are at least substantially parallel to one another, and the other texture differing from the first by a twist of the order of ± 180 degrees."

The applicants disagree. Specifically, Tanaka et al. does not disclose or suggest a method or device wherein the screen uses two textures, which are stable without an applied voltage, the one differing from the other by a twist of ± 180 degrees. Referring to paragraph [0021] of the specification, the claimed bistable nematic crystals are topologically distinct. Furthermore, the transformation from one texture to the other requires the anchoring to be broken (by application of a strong external field). Claims 1 and 35 specifically recite that the method and device implements breaking of anchoring on at least one of the surfaces to switch from the first stable state to the second stable state. The breaking of anchoring on at least one of the two surfaces is required to switch between the two stable states (which differ from each other by ± 180°).

The concept of breaking anchoring is more fully described in the specification at [0017]-[0019]. Specifically, the bistable liquid crystal is placed between two electrodes. The electrodes have anchor layers that orient the liquid crystal molecules in desired directions. The anchoring is weak on one of the anchor layers (denominated the slave plate). The two bistable textures (U (untwisted) and T (twisted)) are stable without an applied electric field. As described

in [0022]-[0024] there is a threshold field E_c that is required to break the anchoring. The voltage that is applied to break the anchoring is a function of the threshold field and the thickness of the liquid crystal cell. Consequently, the claimed method and device uses a surface effect (*i.e.* breaking the anchoring on one anchor layer) to switch from the first stable state to the second stable state. See FIG. 2.

Tanaka et al. describes a high speed multiplex-driven crystal display device. The specification of Tanaka et al. references the liquid crystal medium described in U.S. Patent No. 4,239,345. The medium is described as having an initial texture (angle Ø) that can be switched between two metastable states. Tanaka et al. defines bistable to include metastable states as well as pseudo states "that can be maintained a period of time greater than the time required to change the entire display screen state." Col. 2, ll. 14-21. Metastable states are described as different from the initial state and further as relaxation states. Col. 3, ll. 1-5. Tanaka et al. specifically defines a metastable state as "being sufficiently stable if it can be maintained a sufficiently longer period of time without power support than the period of time or speed required to change the displayed data on the display screen." Col. 3, ll. 16-20. The two metastable states described in Tanaka et al are $Ø-180°$ and $Ø+180°$. Col. 4, ll. 34-35. Tanaka et al. describes the initial state as 180° and the two metastable states as 0° and 360°. Col. 3, ll. 32-50.

The switching principle of Tanaka et al. is described in FIG. 35 and the accompanying text at Col. 8, ll. 25-62. Tanaka et al. describes a first initial voltage V_e which is higher than a threshold voltage V_0 and is high enough to achieve a Frederick's transition. The Frederick's threshold V_{th} is defined as the applied voltage that leads to alignment of the liquid crystal molecules. Tanaka et al. refers to the

application of this reset voltage as a reset state and notes that "in this reset state, the liquid crystal molecules approximately midway of the liquid crystal layer are aligned so that their tilt angles, θ_m is about 90° with respect to the planar surface of the substrate." Col. 8, ll. 25-37. Referring to Fig. 35, it is readily apparent that, upon application of the reset voltage, the orientation in the midway portion becomes perpendicular to the substrate while the orientation of the liquid crystal close to the surface of the cell remains parallel to the corresponding surfaces (where the alignment layer is deposited). According to Tanaka et al. a selected metastable state follows the Frederick's transition. Col. 6, ll. 40-48. V_e is the voltage level applied during T_1 and V_w is the voltage level applied in time period T_2. V_W is the voltage applied to obtain one of the two metastable states. See Col. 6, ll. 60-64 and FIG. 35. Referring to FIG. 35, V_W does not effect the orientation of the liquid crystal at the interface with the alignment layer. That is, orientation of the liquid crystal at the alignment layer remains constant throughout the switching sequence described in Tanaka et al. Consequently Tanaka et al. does not describe a method or device in which a voltage is applied to break the anchoring of the bistable liquid crystals. As such Tanaka et al. does not anticipate independent claims 1 and 35. Nor does Tanaka et al. anticipate the claims that depend from claims 1 and 35.

The Examiner contends that Tanaka contemplates breaking the anchoring at Col. 6, ll. 53-64. However, as noted above and with reference to FIG. 35 Tanaka et al. only contemplates switching from a first metastable state to a second metastable state where in both states, the liquid crystals have the same anchoring (*i.e.* the same orientation at the surface). Nowhere does Tanaka et al. disclose or suggest breaking the anchoring of the liquid crystal. Specifically, Tananka et al.

states: "In the example here, the chiral nematic liquid crystal medium has a 180° twisted molecular structure in its initial state, and its metastable states respectively have a twist angle of 0°, shown at areas a_1, a_2 in FIG. 29B (referred to as the untwisted or uniform state), and a twist angle of 360°, shown in cross-hatch in areas b_1, b_2, b_3 in FIG. 29B (referred to as the twisted state). V_o is the reset voltage required to bring about Frederick's transition, *i.e.* the threshold voltage over which the V_e level brings about this transition and V_{th1}, V_{th2} indicate, respectively, the critical values for the state in areas a_1, a_2, and for the state in areas b_1-b_3." Thus, the voltages contemplated by Tanaka et al. are used to generate a Frederick's transition and to select one of two metastable states. At Col. 3, ll. 60-67 of Tanaka it states: "When the present invention is applied to a liquid crystal display device that utilizes a multiplex driving method, the drive voltages are voltage pulses divided up into an applied voltage in a first period to generate a Frederick's transition in the liquid crystal medium, followed by an applied voltage in a next or second time period to select one of the two metastable states. This is followed by a third applied voltage in a third time period to facilitate multiplex driving."

The portions of Tanaka et al. cited by the Examiner clearly do not disclose or suggest breaking the anchoring of the liquid crystal as recited in claims 1 and 35.

Applicants have amended claims 1 and 35 to include the limitations of claims 2 and 36, respectively. Claims 1 and 35, as amended, recite a bistable nematic liquid crystal having two textures, one texture being uniform or lightly twisted in which the molecules are at least substantially parallel to one another, and the other texture differing from the first by a twist of the order of ±180°. The Examiner contends that this feature is contemplated by Tanaka et al. at Col. 3, ll. 32-59

and FIG. 1. However, applicants note that Tanaka et al. contemplate two metastable states both of which are ±180° from an *initial state*. The initial state is 180° and the two metastable states are therefore 0° and 360°. Col. 3, ll. 44-45. Thus Tanaka et al. does not disclose two stable states differing by ±180° as set forth in the amended claims. Tanaka et al. clearly does not anticipate amended claims 1 and 35.

Nor are these claims rendered obvious from Tanaka et al. because Tanaka et al. does not disclose or suggest breaking the anchoring to switch from a first texture to a second texture differing from the first by a twist of the order of ±180°. Tanaka et al. only contemplates a bulk effect (*i.e.* the Frederick's transition) to change from a first state to one of two metastable states (which differ by 360°).

Applicants further amend claims 1 and 35 to include the limitations of claims 4 and 38, which have been canceled. Specifically, the amended claims recite that the duration of the column signal is less than the row addressing time (*i.e.* the time it takes to break the anchoring and select the texture). The duration of the column signal is also less than the time offset between the two row signals. This feature is clearly not disclosed in or suggested by Tanaka et al.

The Examiner contends that Tananka et al. describes this claimed feature. The Examiner cites Col. 6, ll. 40-64 and Figure 29a in support of this position. However, the applicants fail to see how the cited portions disclose or suggest the claimed relationship between the duration of the column signal and the duration of the row addressing time.

Specifically, in the addressing method described in Tanaka et al., the Frederick's transition is brought about by applying a <u>voltage pulse</u> with an <u>absolute value</u> that is greater than a threshold value in either the initial state or the two metastable states. Col. 4, ll. 20-30. Tanaka et al. provides

numerous waveforms (*e.g.* in FIGs. 2, 3, 5, 6, 9, 10, 13, 14 and 16) that describe the waveform for the scan electrode (which are the row electrodes as described in Col. 21, ll. 15-46 of Tanaka et al.) and the applied signal electrode (the column electrode). Tanaka et al. also describes the composite waveforms. Indeed it is the composite waveform that is referenced to describe the operation of the pixels, and not the waveforms of the individual electrodes. Referring to FIG. 2 in Tanaka et al. the applied scan signal (the row signal) is illustrated as 201, the applied signal electrode waveform, (the column signal) is illustrated as 202 and the combined waveform of 201 and 202 is illustrated as 203. Tanaka et al. describes operation of the display element in terms of the composite waveform. See Col. 10, ll. 26-67. Referring to this waveform (and the waveforms in FIGs. 3, 5, 6, 7, 9, 10, 13, 14, 17 and 20), it is clear that the line or row addressing time taught by Tanaka et al. is the time in which the applied scan electrode switches from V1 to -V1. The column duration signal in Tanaka et al. is the time in which the applied signal electrode waveform, switches between V2 and -V2. Consequently, in Tanaka et al. the duration of the column signal is equal to the row addressing time. Tanaka et al. does not disclose or suggest that the duration of the column signal be less than the row addressing time.

The advantages associated with the claimed relationship between the duration of the column electrode signal, the row addressing time and the time offset between row signals is described at [0016]. As stated in [0019], after breaking of anchoring, a sudden drop of the control voltage in a very short time is all that is required to select the texture. This concept is illustrated in FIG. 6 and paragraph [0056] where the duration of the column signal is clearly less than the duration of the row signal.

In view of the foregoing, applicants submit that amended claims 1 and 35 are neither anticipated by nor obvious from Tanaka et al. Dependent claims 3, 5-34, 37, and 39-68 are not specifically addressed herein, but are deemed patentable at least by virtue of their dependence from claims 1 and 35.

Ono et al. (U.S. Patent No. 6,057,817) and Barberi (U.S. Patent No. 6,327,017) were cited by the Examiner but not applied. The applicants have reviewed these references and have determined that no discussion of these references is required in this response.

As it is believed that all of the rejections set forth in the Official Action have been fully met, favorable reconsideration and allowance are earnestly solicited.

If, however, for any reason the Examiner does not believe that such action can be taken at this time, it is respectfully requested that he/she telephone applicant's attorney at (908) 654-5000 in order to overcome any additional objections which he might have.

If there are any additional charges in connection with this requested amendment, the Examiner is authorized to charge Deposit Account No. 12-1095 therefor.

Dated: September 25, 2007

Respectfully submitted,

By Richard J. Botos

Richard J. Botos
Registration No.: 32,016
LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK, LLP
600 South Avenue West
Westfield, New Jersey 07090
(908) 654-5000
Attorney for Applicants

781772_1.DOC